ABB MEASUREMENT & ANALYTICS | DATA SHEET

EasyLine EL3060 Series

Gas analyzers for use in hazardous areas

Measurement made easy

Intelligently simple, simply intelligent

Comprehensive explosion protection

- Design in IP rating II 2G or EPL Gb for measuring flammable and non-flammable gases for use in Zone 1 and Zone 2
- Approvals in accordance with ATEX, IECEx, TIIS, NEPSI, KCs, EAC

Compact construction

- Flameproof enclosures for the control unit with one analyzer and the Uras26 infrared analyzer
- Combination of two analyzers with up to five measuring components possible

Easy installation

- No purging of the flameproof enclosures
- Easy and safe connection without opening the flameproof enclosures (Ex-d factory wiring)

Easy handling

- Safe operation by means of touch-sensitive keypads through the glass sight window of the control unit without opening the flameproof enclosure
- Multilingual menu-driven user interface

Simple communication

- Ethernet, Modbus and PROFIBUS interfaces
- Configurable analog outputs and digital inputs and outputs

Overview of the gas analyzers

Measuring technology – Analyzers

The EL3060 Series includes the following analyzers

- Uras26 infrared photometer for the measurement of infrared-active gas components, e.g. CO, NO, SO_2,
- Magnos206 oxygen analyzer for the measurement of O_2 in process gas or in N_2,
- Magnos28 oxygen analyzer for the measurement of O_2 in process gas or in N_2,
- Caldos27 thermal conductivity analyzer for the measurement of e.g. Ar in O_2, H_2 in Ar, CH_4 in N_2
- Caldos25 thermal conductivity analyzer for the measurement of e.g. H_2 in N_2 or air or SO_2 in N_2 or air

as well as the EL3060-CU control unit.

An EL3060 gas analyzer consists of the control unit and one or two analyzers.

The Magnos206, Magnos28, Caldos27 and Caldos25 analyzers are installed in the housing of the control unit. They can also be used in combination with the analyzer Uras26. The analyzer Uras26 is installed in a separate housing; it is connected to the control unit via a data transmission cable and a power supply cable.

Each analyzer has one physical measurement range per sample component. A section of the physical measurement range can be mapped to the current output (analog output) by on-site configuration.

Calibration is always executed in the physical measurement range. The permissible measurement range limits are given by the specification of the smallest and largest measurement ranges for the individual analyzers.

Housing – Explosion protection

The housing of the EL3060-CU control unit is designed as a field mount housing of die-cast aluminum in the 'Flame-proof Enclosure d' type of protection in accordance with EN 60079-1 and in the IP65 housing protection. The display and operator control unit is installed behind a glass viewing window on the front of the housing.

A terminal housing in the 'Increased Safety e' type of protection in accordance with EN 60079-7 is flange-mounted on the underside of the flameproof housing, in which the terminal strip for the electrical connections is installed. Certified electrical conductor bushings are installed between the interior of the explosion housing and the terminal housing in increased safety.

The housing of the Uras26 analyzer is designed as a cylindrical field mount housing of die-cast aluminum in the 'Flameproof Enclosure d' type of protection in accordance with EN 60079-1 and made in IP65 or IP54 housing protection. The data transmission cable and the power supply cable for connection to the control unit are permanently connected at the factory and led through flame-proof cable glands on the underside of the housing.

The housings of the gas analyzers comply with the requirements of the explosion group IIC. As a result, the gas analyzers can also be used in hydrogen- or acetylene-containing atmospheres.

The housing can be purged with air from the non-hazardous area or with inert gas to protect the gas analyzers in a corrosive environment or with corrosive sample or associated gases.

All gas connections are led through flame barriers.

Calibration

The Uras26 infrared photometer can be equipped with gas-filled calibration cells as an option; this allows test gas cylinders to be dispensed with to a large extent.

Owing to their very low sensitivity drift, the Magnos206 and Magnos28 oxygen analyzers can be routinely calibrated solely at the zero point by means of single-point calibration, provided that the measuring range is more than 0–5 vol.% of O_2; nitrogen or ambient air is used for this purpose.

Nitrogen or ambient air is used for this purpose. Automatic calibration – for all sample components together – is normally started on a cyclically time-controlled basis; it can also be started by an external control signal or via the Modbus as well as manually on the display and operator control unit of the gas analyzer.

Operation

Five touch screen fields accessible through the control unit viewing glass allow safe operation of the gas analyzer without opening the housing. The menu-driven control system is uniform for all gas analyzers.

Control unit

The EL3060-CU control unit performs the following functions:

- Processing and transmitting measured values provided by the analyzer's sensor electronics,
- Calculation of the measured values
- Controlling device functions, e.g. calibration,
- Display and control functions,
- Communicating with external systems.

Electrical interfaces

The electrical interfaces for the output of measured values and communication with external systems include

- the integrated Ethernet-10/100BASE-T interface for device configuration using the ECT configuration program, data transmission using the Modbus TCP/IP protocol (measured values, status signals, control signals) and QAL3 data transmission (optional)

as well as the I/O modules

- Profibus module with one RS485 and one MBP interface (also in accordance with VDI 4201 Part 2),
- Modbus module with one RS232 and one RS485 interface (also in accordance with VDI 4201 Part 3),
- Digital I/O module with four digital inputs and four digital outputs,
- Analog output module with four analog outputs.

A maximum of 3 I/O modules can be integrated in the gas analyzer. The following combinations of I/O modules are allowed, depending on the functional range and order:

- 1 analog output module and 1 digital I/O module (standard),
- 1 analog output module and 2 digital I/O modules,
- 1 analog output module, 1 digital I/O module and either a Modbus module or a Profibus module,
- 1 Modbus module,
- 1 Profibus module.

Infrared photometer Uras26

Measurement principle

Photometer in accordance with the NDIR method (non-dispersive infrared absorption)

Sample components and measurement ranges

Sample component[1)]	Measuring range Class 1	Measuring range Class 2	Measuring range Class 2 with calibration cell	Gas group[2)]
CO	0–50 ppm	0–10 ppm	0–50 ppm[3)]	A
CO_2	0–50 ppm	0–5 ppm	0–25 ppm[3)]	A
NO	0–150 ppm	0–75 ppm	0–75 ppm[3)]	A
SO_2	0–100 ppm	0–25 ppm	0–25 ppm[3)]	A
N_2O	0–50 ppm	0–20 ppm	0–50 ppm[3)]	A
CH_4	0–100 ppm	0–50 ppm	0–50 ppm[3)]	A
NH_3	0–500 ppm	0–30 ppm	–	B
C_2H_2	0–200 ppm	0–100 ppm	0–100 ppm	B
C_2H_4	0–500 ppm	0–300 ppm	0–300 ppm	B
C_2H_6	0–100 ppm	0–50 ppm	0–50 ppm[3)]	B
C_3H_6	0–250 ppm	0–100 ppm	0–100 ppm[3)]	B
C_3H_8	0–100 ppm	0–50 ppm	0–50 ppm[3)]	B
C_4H_{10}	0–100 ppm	0–50 ppm	0–50 ppm[3)]	B
C_6H_{14}	0–500 ppm	0–100 ppm	0–100 ppm[3)]	B
R 134a	0–100 ppm	0–50 ppm	0–50 ppm[3)]	B
SF_6	0–2000 ppm	0–1900 ppm	0–2000 ppm	B
H_2O	0–1000 ppm	0–500 ppm	0–500 ppm	C

The small measuring ranges are provided accordingly. They are based on the 1st sample component in the beam path.

1) other sample components on request
2) See price information
3) The smallest measurement range 1 is shown.

Number of sample components
1 to 4 components with 1 or 2 beam paths and
1 or 2 receivers in each beam path

Number of measurement ranges
2 ranges per sample component

Largest measurement range
0–100 vol.% or 0 vol.% to saturation or 0 vol.% to LEL. Measurement ranges within ignition limits cannot be provided.

Measurement range ratio
≤ 1:10 to 1:20 depending on sample components

The following measurement-related data applies to measuring range 1 in a delivered analyzer.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant.

Linearity deviation
≤ 1 % of span

Repeatability
≤ 0.5 % of span

Zero drift
≤ 1 % of span per week;
for ranges smaller than class 1 to class 2:
≤ 3 % of span per week

Sensitivity drift
≤ 1 % of measured value per week

Output fluctuation (2 σ)
≤ 0.2 % of span at electronic T_{90} time = 5 s (class 1)
or = 15 s (class 2)

Detection limit (4 σ)
≤ 0.4 % of span at electronic T_{90} time = 5 sec (class 1)
or = 15 sec (class 2)

Influence effects

Flow effect
Flow rate in range of 20–100 l/h: ≤ 1 % of span at a flow rate change of 10 l/h

Associated gas effect/Cross sensitivity
The knowledge of the sample gas composition is necessary for the analyzer configuration.
Selectivation measures to reduce the associated gas effect (options): incorporation of interference filters or filter cells, internal electronic cross-sensitivity or carrier gas correction for one sample component by other sample components measured with the Uras26.

Temperature effect
Ambient temperature in the permissible range
- at the zero point: ≤ 1 % of the span per 10 °C;
  for measuring ranges smaller than class 1 to class 2:
  ≤ 2 % of the span per 10 °C
- on the sensitivity with temperature compensation:
  ≤ 3 % of the measured value per 10 °C
- on the sensitivity with thermostat effect (optional): ≤ 2 % of the measured value per 10 °C

Air pressure effect
- at the zero point: no effect
- on sensitivity with pressure correction using an integrated pressure sensor: ≤ 0.2 % of the measured value per 1 % of air pressure change

Dynamic response

Warm-up time
Approx. 30 minutes without thermostat;
approx. 2.5 hours with thermostat

T_{90} time
T_{90} = 2.5 sec for sample cell length = 200 mm,
sample gas flow = 60 l/h, electronic T_{90} time = 0 sec

Calibration

Zero-point calibration
With inert gas, e.g. N_2, or with ambient air that is free of the sample component.

End-point calibration
With gas-filled calibration cells (optional) or with test gas mixtures. It is recommended to verify the calibration cell set values once a year.
During calibration of a multi-component analyzer, possible cross-sensitivity and/or carrier gas corrections by internal or external measurement components are switched off. Therefore, corrected measurement components should be calibrated only using a test gas consisting of the measurement component and an inert gas like N_2.

Materials in contact with the sample medium

Analyzer (sample cells)
Tube: aluminum or gold-plated aluminum;
window: CaF_2, optional: BaF_2;
connectors: stainless steel 1.4571

Gas lines, connectors and flame barriers
Stainless steel 1.4571 (AISI 316Ti)

Oxygen analyzer Magnos206

Measurement principle

Paramagnetic behavior of oxygen

Magnetomechanical oxygen analyzer

Sample component and measurement ranges

Sample component
Oxygen (O_2)

Smallest measurement range
0–0.5 vol.-% O_2

Number of measurement ranges
2 Measuring ranges
The measuring range limits are freely adjustable. They are factory-set either to 0–25/100 vol.% O_2 or in accordance with the order.

Largest measurement range
0–100 vol.% O_2 Measurement ranges within ignition limits cannot be provided.

Measurement ranges with suppressed zero-point
Suppression ratio max. 1:10, e.g. 19–21 vol.% O_2; pressure correction using pressure sensor required.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant.

Linearity deviation
≤ 50 ppm O_2

Repeatability
≤ 50 ppm O_2 (time base for gas exchange ≥ 5 minutes)

Zero drift
≤ 0.03 vol.% O_2 per week

Span drift
≤ 0.1 vol.% O_2 per week or ≤ 1 % of the measured value per week (not cumulative), whichever is smaller; ≤ 0.25 % of the measured value per year

Output fluctuation (2 σ)
≤ 25 ppm O_2 at electronic T_{90} time (static/dynamic) = 3/0 sec

Detection limit (4 σ)
≤ 50 ppm O_2 at electronic T_{90} time (static/dynamic) = 3/0 sec

Influence effects

Flow effect
Sample gas N_2: ≤ 0.1 vol.% O_2 in permissible range;
sample gas air: ≤ 0.1 vol.% O_2 with a flow rate change of 10 l/h

Associated gas effect
Data regarding the effect of associated gases can be found in IEC 61207-3: 2002 'Gas analyzers – Expression of performance – Part 3: Paramagnetic oxygen analyzers'.

Temperature effect
Average effect in permissible ambient temperature range
– at zero point: ≤ 0.02 vol.% O_2 per 10 °C
– on the sensitivity ≤ 0.1 % of the measured value per 10 °C
Thermostat temperature = 64 °C

Air pressure effect
– on sensitivity without pressure correction ≤ 1 % of the measured value per 1 % of air pressure change
– on sensitivity with pressure correction using an integrated pressure sensor (optional): ≤ 0.2 % of the measured value per 1 % of air pressure change

Position effect
Zero-point shift ≤ 0.05 vol.% O_2 per 1° deviation from horizontal location. Position has no effect on the hard-mounted unit.

Dynamic response

Warm-up time
< 2 hours

T_{90} time
T_{90} ≤ 7 sec (≤ 8 sec in the version for measuring gases under positive pressure, see page 12) at a sample gas flow = 90 l/h and electronic T_{90} time (static/dynamic) = 3/0 sec, gas change from N_2 to air

Calibration

Zero-point calibration
With oxygen-free process gas or substitute gas

End-point calibration
With process gas with a known oxygen concentration or a substitute gas such as dried air

Single-point calibration
For measurement ranges from 0–5 vol.% O_2 to 0–25 vol.% O_2
Zero-point calibration with any oxygen concentration, e.g. with nitrogen (N_2) or ambient air, processed through a cooler or H_2O absorber.
Pressure correction by means of pressure sensor is recommended for single-point calibration with air.
Depending on the measurement task involved, the zero- and end-points should be verified periodically (Recommendation: once a year).

Calibration of measurement ranges with suppressed zero-point
Single-point calibration is possible for suppressed measurement ranges with a suppression ratio ≤ 1:5. The O_2 concentration of the test gas must lie within the measurement range.

Materials in contact with the sample medium

Analyzer (sample chamber)
Stainless steel 1.4305, glass, platinum, rhodium, epoxy resin; gaskets: FPM, optional: FFKM75

Gas lines, connectors and flame barriers
Stainless steel 1.4305 (AISI 303), 1.4571 (AISI 316Ti)

Oxygen analyzer Magnos28

Measurement principle

Paramagnetic behavior of oxygen

Magnetomechanical oxygen analyzer

Sample component and measurement ranges

Sample component
Oxygen (O_2)

Smallest measurement range
0…0.5 Vol.-% O_2

Quantity and measurement range limits
2 Measuring ranges
The measuring range limits are freely adjustable. They are factory-set either to 0…25/100 vol.% O_2 or in accordance with the order.

Largest measurement range
0…100 Vol.-% O_2
Measurement ranges within ignition limits cannot be provided.

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant.

Linearity deviation
≤ 0.5 % of the span or 0.005 vol. % O_2 the greater value applies

Repeatability
≤ 50 ppm O_2

Zero drift
≤ 3 % of span of the smallest measuring range (in accordance with order) per week, or 0.03 vol.% O_2 per week, whichever value is greater
The value may be elevated during first commissioning or after a longer service life.

Span drift
≤ 0.1 vol.% O_2 per week or ≤ 1 % of measured value per week (not cumulative), whichever is smaller; ≤ 0.15 % of measured value per three months, minimum 0.03 vol.% O_2 per 3 months, whichever is greater

Output fluctuation (2 σ)
≤ 25 ppm O_2 at electronic T_{90} time (static/dynamic) = 3/0 sec

Detection limit (4 σ)
≤ 50 ppm O_2 at electronic T_{90} time (static/dynamic) = 3/0 sec

Influence effects

Flow effect
Sample gas N_2: ≤ 0.1 vol.% O_2 in permissible range;
sample gas air: ≤ 0.1 vol.% O_2 with a flow rate change of 10 l/h

Associated gas effect
Data regarding the effect of associated gases can be found in IEC 61207-3: 2002 'Gas analyzers – Expression of performance – Part 3: Paramagnetic oxygen analyzers'.

Temperature effect
Average effect in permissible ambient temperature range
– at zero point: ≤ 0.05 vol.% O_2 per 10 °C
– on the sensitivity ≤ 0.1 % of the measured value per 10 °C
Thermostat temperature = 60 °C (140 °F)
For very small measuring ranges (≤ 0…1 vol. % O_2) greater temperature fluctuations (≥ 5 °C) at the installation site should be avoided.

Air pressure effect
– on sensitivity without pressure correction ≤ 1 % of the measured value per 1 % of air pressure change
– on sensitivity with pressure correction using an integrated pressure sensor (optional): ≤ 0.1 % of the measured value per 1 % of air pressure change

Position effect
Zero-point shift ≤ 0.05 vol.% O_2 per 1° deviation from horizontal location. Position has no effect on the hard-mounted unit.

Dynamic response

Warm-up time
2–4 hours, depending on ambient conditions.
The value may be elevated during first commissioning or after a longer service life.

T_{90} time
T_{90} ≤ 5 sec (≤ 6 sec in the version for measuring gases under positive pressure, see page 12) at a sample gas flow = 90 l/h and electronic T_{90} time (static/dynamic) = 3/0 sec, gas change from N_2 to air

Calibration

Zero-point calibration
With oxygen-free process gas or substitute gas

End-point calibration
With process gas with a known oxygen concentration or a substitute gas such as dried air

Single-point calibration
For measurement ranges from 0…5 vol.% O_2 to 0…25 vol.% O_2
Zero-point calibration with any oxygen concentration, e.g. with nitrogen (N_2) or ambient air, processed through a cooler or H_2O absorber.
Pressure correction by means of pressure sensor is recommended for single-point calibration with air.
Depending on the measurement task involved, the zero- and end-points should be verified periodically (Recommendation: once a year).

Materials in contact with the sample medium

Analyzer (sample chamber)
Stainless steel 1.4305, nickel alloy, glass, PtNi, silicon, gold, PTFE; FPM gaskets, optional: FFKM75

Gas lines, connectors and flame barriers
Stainless steel 1.4305 (AISI 303), 1.4571 (AISI 316Ti)

Thermal conductivity analyzer Caldos27

Measurement principle

Difference in thermal conductivity of various gases

Micromechanical silicon sensor with especially short T_{90} time

Sample components and measurement ranges

Sample component and associated gas	Smallest measuring range	Smallest measurement range with suppressed zero-point
Air in Ar	0–6 vol.-%	94–100 vol.-%
Ar in air	0–6 vol.-%	94–100 vol.-%
Air in CO_2	0–10 vol.-%	90–100 vol.-%
CO_2 in air	0–10 vol.-%	90–100 vol.-%
Air in H_2	0–3 vol.-%	–
H_2 in air	0–1 vol.-%	–
Ar in He	0–3 vol.-%	98–100 vol.-%
He in air	0–2 vol.-%	97–100 vol.-%
Ar in CO_2	–	50–100 vol.-%
CO_2 in Ar	0–50 vol.-%	–
Ar in H_2	0–3 vol.-%	99–100 vol.-%
H_2 in Ar	0–1 vol.-%	97–100 vol.-%
Ar in He	0–3 vol.-%	99–100 vol.-%
He in Ar	0–1 vol.-%	97–100 vol.-%
Ar in N_2	0–6 vol.-%	94–100 vol.-%
N_2 in Ar	0–6 vol.-%	94–100 vol.-%
Ar in O_2	0–10 vol.-%	90–100 vol.-%
O_2 in Ar	0–10 vol.-%	90–100 vol.-%
CH_4 in H_2	0–3 vol.-%	99–100 vol.-%
H_2 in CH_4	0–1 vol.-%	97–100 vol.-%
CH_4 in N_2	0–6 vol.-%	94–100 vol.-%
N_2 in CH_4	0–6 vol.-%	94–100 vol.-%
CO in H_2	0–3 vol.-%	99–100 vol.-%
H_2 in CO	0–1 vol.-%	97–100 vol.-%
CO_2 in H_2	0–3 vol.-%	99–100 vol.-%
H_2 in CO_2	0–1 vol.-%	97–100 vol.-%
CO_2 in N_2	0–10 vol.-%	90–100 vol.-%
N_2 in CO_2	0–10 vol.-%	90–100 vol.-%
H_2 in N_2	0–1 vol.-%	97–100 vol.-%
N_2 in H_2	0–3 vol.-%	99–100 vol.-%
H_2 in NH_3	0–10 vol.-%	90–100 vol.-%
NH_3 in H_2	0–10 vol.-%	90–100 vol.-%
He in N_2	0–2 vol.-%	97–100 vol.-%
N_2 in He	0–3 vol.-%	98–100 vol.-%

Other sample components on request

Version for monitoring hydrogen-cooled turbo generators

Sample component and associated gas	Measurement range
CO_2 in air	0–100 vol.-%
H_2 in CO_2	100–0 vol.-%
H_2 in air	100–80/90 vol.%

Number of sample components
1 to 4 sample components, manual switchover

Number of measuring ranges
2 measurement ranges per sample component. Measurement ranges are freely adjustable within the limits shown in the table. They are factory-calibrated for the largest possible measurement range.

Largest measurement range
0–100 vol.-% or 0 vol.-% to saturation. Measurement ranges within ignition limits cannot be provided.

Measurement ranges with suppressed zero-point
See the adjacent table for spans

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant. They are based on the smallest measuring ranges given in the table; the deviations may be larger for smaller measurement ranges.

Linearity deviation
≤ 2 % of span

Repeatability
≤ 1 % of span

Zero drift
≤ 2 % of smallest possible measurement range per week

Sensitivity drift
≤ 0.5 % of the smallest feasible measuring range per week

Output fluctuation (2 σ)
≤ 0.5 % of smallest measurement range span at electronic T_{90} time = 0 sec

Detection limit (4 σ)
≤ 1 % of smallest measurement range span at electronic T_{90} time = 0 sec

Influence effects

Flow effect
≤ 0.5–2.5 % of span at a flow rate change of 10 l/h At an identical flow rate for test and sample gases the flow rate effect is automatically compensated.

Associated gas effect
The knowledge of the sample gas composition is necessary for the analyzer configuration. If the sample gas contains components in addition to the sample component and associated gas (binary gas mixture), this will result in erroneous measurements.

Temperature effect
Ambient temperature in the permissible range in any point of the measuring range: ≤ 1 % of span per 10 °C, based on the temperature at the time of calibration.

Air pressure effect
≤ 0.25 % of span per 10 hPa for the smallest possible ranges given; for larger spans, the effect is correspondingly lower. Operating altitude over 2000 m

Position effect
< 1 % of span up to 30° deviation from horizontal orientation

Dynamic response

Warm-up time
Approx. 30 minutes

T_{90} time
T_{90} ≤ 2 sec at sample gas flow of 60 l/h

Calibration

Zero-point calibration
With test gas, measurement component-free process gas or substitute gas

End-point calibration
with test gas, process gas having a known sample gas concentration or substitute gas

Simplified calibration with standard gas
A single-point calibration can be performed with standard gas, since the zero- and end-points will not drift independently due to the sensor principle employed. This technique leaves out safety-related measurements.
Depending on the measurement task involved, the zero- and end-points should be verified periodically (Recommendation: once a year).

Materials in contact with the sample medium

Analyzer
Sensor: gold, silicon oxi-nitride; measuring chamber: stainless steel 1.4305; gasket: FFKM75

Gas lines, connectors and flame barriers
Stainless steel 1.4305 (AISI 303), 1.4571 (AISI 316Ti)

Thermal conductivity analyzer Caldos25

Measurement principle

Difference in thermal conductivity of various gases

Thermal conductivity analyzer, sample cells embedded in glass

Sample components and measurement ranges

Sample component and associated gas	Smallest measurement range	Reference gas
H_2 in N_2 or air	0–0.5 vol.-%	Air
SO_2 in N_2 or air	0–1.5 vol.-%	Air

Other sample components on request

Number of sample components
1 to 3 sample components, manual switchover

Number of measurement ranges
1 measuring range per sample component
The measuring range is factory-set in accordance with the order.

Largest measurement range
0–100 vol.-% or 0 vol.-% to saturation. Measurement ranges within ignition limits cannot be provided.

Measurement ranges with suppressed zero-point
Span at least 2 vol.-%, depending on application

Stability

The following data only applies if all the influence variables (e.g. flow, temperature and air pressure) are constant.

Linearity deviation
≤ 2 % of span

Repeatability
≤ 1 % of span

Zero drift
≤ 1 % of span per week

Sensitivity drift
≤ 1 % of measured value per week

Output fluctuation (2 σ)
≤ 0.5 % of smallest measurement range span at electronic T_{90} time = 0 sec

Detection limit (4 σ)
≤ 1 % of smallest measurement range span at electronic T_{90} time = 0 sec

Influence effects

Flow effect
≤ 1–5 % of span at a flow change of 10 l/h. At an identical flow rate for test and sample gases the flow rate effect is automatically compensated.

Associated gas effect
The knowledge of the sample gas composition is necessary for the analyzer configuration. If the sample gas contains components in addition to the sample component and associated gas (binary gas mixture), this will result in erroneous measurements.

Temperature effect
Ambient temperature in the permissible range
in any point of the measuring range:≤ 1 % of span per 10 °C, based on the temperature at the time of calibration.

Position effect
< 1 % of span up to 10° deviation from horizontal orientation

Dynamic response

Warm-up time
2–4 hours, depending on measurement range

T_{90} time
T_{90} = 10–20 sec; option: T_{90} < 6 sec

Calibration

Zero-point calibration
With sample component-free process gas or substitute gas

End-point calibration
With process gas having a known sample gas concentration or with substitute gas

Materials in contact with the sample medium

Analyzer
Stainless steel 1.4305 (AISI 303), glass

Gas lines, connectors and flame barriers
Stainless steel 1.4305 (AISI 303), 1.4571 (AISI 316Ti)

General data

Housing – Explosion protection

Control unit (with or without Magnos206, Magnos28, Caldos25 or Caldos27 analyzer)

Version
Flameproof enclosure with a glass viewing window and a flange-mounted junction box

Type of protection
Housing: flameproof enclosure ‘d’ in accordance with EN 60079-1, terminal housing: increased safety ‘e’ in accordance with EN 60079-7

Housing protection type
IP65 per EN 60529

Materials
Aluminum, glass

Color
Light gray (RAL 7035)

Weight
Approx. 20 kg

Dimensions
See page 15

Analyzer unit Uras26

Version
Flameproof enclosure (cylinder)

Type of protection
Flameproof enclosure ‘d’ per EN 60079-1

Housing protection type
IP65 with O-ring seal inserted between case bottom and case (vertical or horizontal mounting allowed) or
IP54 without O-ring seal (only vertical mounting allowed)

Material
Aluminum

Color
Light gray (RAL 7035)

Weight
approx. 25 kg

Dimensions
See page 16

Housing purge

Use
To protect the gas analyzers in corrosive environments or when using corrosive sample or associated gases an option is available to allow the housings of the central unit and the Uras26 analyzer unit to be purged.

Purge gas
Clean instrument air from non-explosive areas or inert gas. The purge gas for purging the Uras26 analyzer unit must not contain any sample gas components.

Purge gas pressure
$p_{abs} \leq 1080$ hPa

Purge gas flow
During operation ≤ 10 l/h

Pressure drop at the flame barriers
approx. 20 hPa at a flow rate of 10 l/h

Display and operation

Display
Backlit graphics display, 240 x 160-pixel resolution

Measured value display
– Numerical value with physical unit, also with bargraph indication in single display
– Resolution better than 0.2 % of the measurement span
– Simultaneous display of up to 5 measured values

Status display
Symbols in the display; the active status messages can be accessed directly from the measured value display

Operation
5 keys (cursor cross and OK); menu-assisted operation

Concept of operation
The functions required in normal operation are operated and configured directly on the gas analyzer. The device functions which are only seldom required, e.g. during commissioning, are configured offline using the ECT configuration program (‘EasyLine Configuration Tool’ on the enclosed DVD-ROM) and then loaded into the gas analyzer.

Measuring range switch-over and feedback
There are three ways of executing the measuring range switch-over:
– Manually on the gas analyzer
– Automatically by means of appropriate configured switchover thresholds (‘autorange’)
– Externally controlled via appropriately configured digital inputs.

The measuring range feedback can be implemented via appropriately configured digital outputs; it is independent of the selected type of measuring range switch-over.
The gas analyzer is set ex works to measuring range 2 and to manual measuring range switchover.

Limit value monitoring
Limit values can be set using the software tool ECT. The limit value signals (alarms) are output via digital outputs.

… General data

Pressure sensor

Use
Standard equipment in the Uras26 and Caldos27, optional in the Magnos206 and Magnos28. The pressure sensor measures the air pressure inside the housing as standard. As an option, the connection of the pressure sensor is led outside to a flame barrier; it may not be connected to the sample gas feed path when measuring flammable and corrosive gases.
Pressure sensor working range: p_{abs} = 600–1250 hPa

Materials of the wetted parts
Silicone gel, plastic, FPM;
Flame barrier: stainless steel 1.4571

Sample gas inlet conditions under atmospheric conditions

Sample gas composition
The standard version of the gas analyzer is capable of measuring flammable and non-flammable gases under atmospheric conditions which can form an explosive environment. The maximum oxygen content of the sample gas mixture should be 21 vol.-%, corresponding to atmospheric conditions. If the sample gas is a mixture only of oxygen and flammable gases and vapors, it must not be explosive under any conditions. As a rule, this can be achieved by limiting the oxygen content to a maximum of 2 vol.%. Flammable gases which are potentially explosive under the conditions applicable for the analysis, even without the presence of oxygen, may only be contained in the mixture to be analyzed in non-safety-critical concentrations. Flammable gases which are potentially explosive under the conditions applicable for the analysis, even without the presence of oxygen, may only be contained in the mixture to be analyzed in non-safety-critical concentrations.

Temperature
The sample gas dew point should be at least 5 °C (9 °F) below the temperature throughout the sample gas path. Otherwise a sample gas cooler or condensate trap is required. Water vapor content variations cause volume errors.

Inlet pressure
Absolute pressure max. 1100 hPa or gauge pressure max. 100 hPa (15.95 psi or 1.45 psi)

Flow rate
Uras26: 20–100 l/h; Magnos206, Magnos28: 30–90 l/h;
Caldos25, Caldos27: max. 100 l/h

Pressure drop at the flame barriers
approx. 40 hPa at a flow rate of 50 l/h

Outlet pressure
The outlet pressure must be the same as the atmospheric pressure.

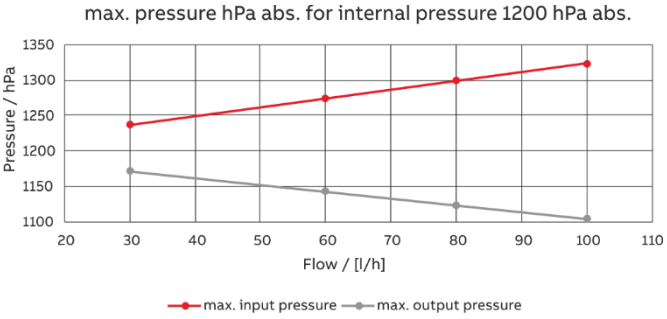
Sample gas inlet conditions with positive pressure in the sample gas feed path

Sample gas composition
A special version of the gas analyzer is suitable for measuring non-flammable and flammable gases under positive pressure. Under no circumstances may the sample gas be potentially explosive. If the sample gas consists of non-flammable gases and vapors, the oxygen content may be max. 21 vol.-% as per atmospheric conditions. If the sample gas consists solely of oxygen and flammable gases and vapors, it is generally not potentially explosive if the oxygen content is safely limited to max. 2 vol.%. Flammable gases which are potentially explosive under the conditions applicable for the analysis, even without the presence of oxygen, may only be contained in the mixture to be analyzed in non-safety-critical concentrations. Flammable gases which are potentially explosive under the conditions applicable for the analysis, even without the presence of oxygen, may only be contained in the mixture to be analyzed in non-safety-critical concentrations.

Sample gas inlet and outlet conditions for Magnos206, Magnos28, Caldos25, Caldos27 analyzers

Temperature
+5 to 50 °C (41 to 122 °F)

Inlet and outlet pressure
The sample gas pressure in the sample gas feed path of the analyzer may be max. 200 hPa positive pressure (1200 hPa absolute pressure). The pressure drop at the flame barrier at the sample gas inlet means this can be achieved by maintaining max. 200 hPa positive pressure (1200 hPa absolute pressure) at the sample gas inlet or adhering to the pressure limits for the sample gas inlet and outlet as shown in the following diagram:



Flow rate
max. 80 l/h

Pressure drop at the flame barriers
approx. 130 hPa at a flow rate of 60 l/h

Sample gas inlet and outlet conditions for Uras26 analyzer

Temperature
+5 to 45 °C (41 to 113 °F)

Inlet pressure
Absolute pressure max. 1200 hPa (17.40 psi) or positive pressure max. 200 hPa (2.90 psi)

Flow rate
max. 100 l/h

Pressure drop **on the flame barriers**
approx. 40 hPa at a flow rate of 50 l/h

Housing design of the control unit with an analyzer
The control unit housing must be equipped with a vent if an analyzer (Magnos206 or Magnos28 or Caldos25 or Caldos27) is installed in the control unit.

Housing design of the Uras26 analyzer unit
The analyzer unit housing must be equipped with two vents. The "flowing reference gas" option is not available.

Power supply

Input voltage
100–240 V AC, – 15/+ 10 %, 50–60 Hz ± 3 Hz

Power consumption
Max. 187 VA

Safety

Tested per EN 61010-1:2010

Protection class
I

Overload category/pollution level
Power supply: II/2

Safe isolation
The power supply is galvanically isolated from other circuits by means of reinforced or double insulation. Operational low voltage (PELV) on low-voltage side

Electromagnetic compatibility

Noise immunity
Tested to EN 61326-1:2013. Inspection level: industrial area, fulfills at least the evaluation criteria in accordance with Table 2 of EN 61326.

Emitted interference
Tested to EN 61326-1:2013. Limit value class B for interference field strength and interference voltage is met.

Mechanical stress

Operation
Vibration test in accordance with EN 60068-2-6:1996
Vibrations up to 0.5 g/150 Hz have no influence on the measured value. In Uras26, slight transient effects on the measured value can occur in the region of the modulation frequency.

Transport
Vibration test in accordance with EN 60068-2-6:1996,
Shock test in accordance with EN 60068-2-27:1995
The gas analyzer in its original packaging will withstand normal shipping conditions.

Ambient conditions

The gas analyzer is intended for indoor installation only.

Ambient temperature

Control unit with/without built-in analyzer:	+5 to +50 °C
Uras26 without/with another analyzer	+5 to +45 °C
Storage and transport	–25 to +65 °C

Explosion protection is not impaired if the gas analyzer is operated at temperatures lower than +5 °C to –20 °C. However in this temperature range the compliance with the metrological data cannot be guaranteed.

Relative humidity
max. 75 %, slight condensation allowed

Installation location altitude
Max. 2000 m (6560 ft) above sea level (over 2000 m (6560 ft) on request)

Notes regarding the measurement-related data of the analyzers

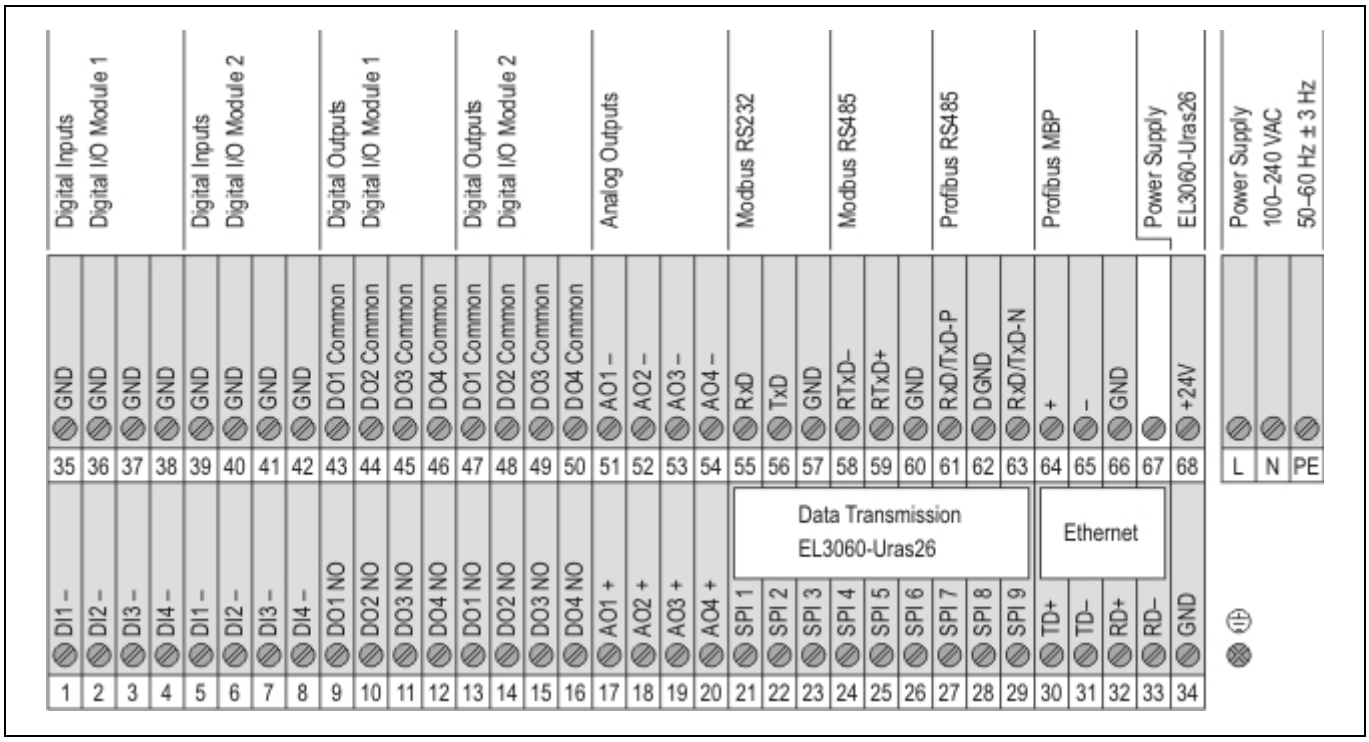
The measurement-related data of the analyzers has been determined in accordance with IEC 61207-1:2010 'Expression of performance of gas analyzers – Part 1: General'. They are based on operation at atmospheric pressure (1013 hPa) and nitrogen as the associated gas. Compliance with these characteristics when measuring other gas mixtures can only be assured if their composition is known.

The physical detection limit is the lower limit of the measurement-related data relative to the measuring range span.

The drift values may be increased during the first few days after first commissioning as well as after recommissioning following prolonged standstill and storage times.

Electrical connections

Power supply and signal lines



Analog outputs
0/4–20 mA (configurable, factory-set to 4–20 mA), common negative pole, electrically isolated from ground, freely connectible to ground, max. gain relative to protective ground potential max. 50 V, max. load 750 Ω. Resolution 16 bit. The output signal cannot be lower than 0 mA.

Digital inputs
Optocouplers with internal 24 V DC power supply. Control with floating contacts or with open collector drivers NPN.

Digital outputs
Floating contacts, max. contact load rating 30 V DC/1 A. Relays must at all times be operated within the specified data range. Inductive or capacitive loads are to be connected with suitable protective measures (self-induction recuperation diodes for inductive loads and series resistors for capacitive loads).

Modbus, Profibus
Either the Modbus module or the Profibus module can be installed in the gas analyzer as an option.

Ethernet interface
Communication with the ECT configuration software for device configuration and software update, data transmission with Modbus TCP/IP protocol (measured values, status signals, control signals) and QAL3 data transfer (optional).

Design of the electrical connections
Terminal blocks with screw connection, conductor size single-core 0.2–4 mm² (24–12 AWG), stranded 0.22–2.5 mm² (24-14 AWG)

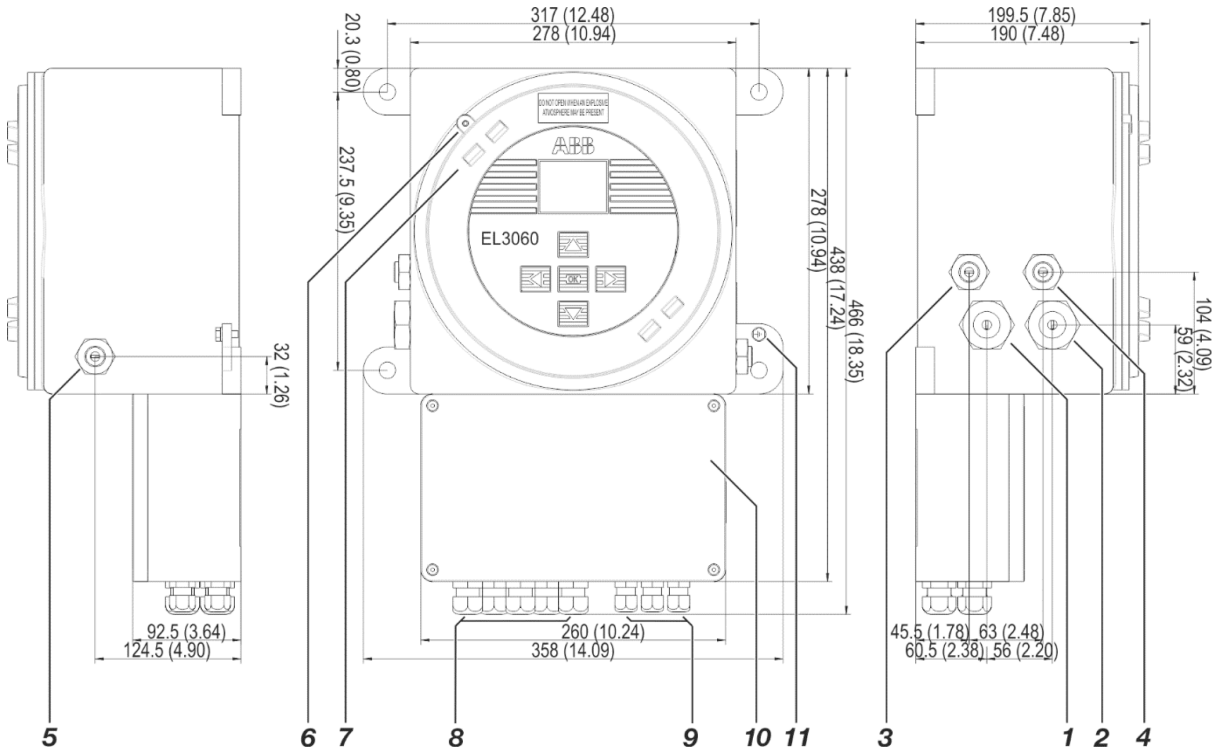
Note: Not all signal inputs and outputs are actually used, depending on the configuration of the gas analyzer.

Digital input and output signals	Digital I/O-Module [1] 1	2 (option)
Failure		
Maintenance request		
Maintenance mode		
Overall status	DO1	
Start automatic calibration	DI1	
Stop automatic calibration		
Disable automatic calibration	DI2	
Sample gas valve	DO4	
Zero point gas valve		
End point gas valves 1 to 5		
Limit 1	DO2	
Limit 2	DO3	
Limit 3		DO1
Limit 4		DO2
Limit 5		DO3
Limit 6		DO4
Limit 7		
Limit 8		
Limit 9		
Limit 10		
Measuring range switchover		
Measuring range feedback		
Measuring component switchover		
Measuring component feedback		
Bus DIs 1 to 8		
External failure [2]	DI3	
External maintenance request [2]	DI4	

1) factory-set, can be reconfigured during operation
2) multiple external status signals can be configured depending on the number of free digital inputs.

Dimensions, gas connections

Control unit



All dimensions in mm (in)

	Standard version:	Version for measuring gases under positive pressure:
1	Sample gas inlet [1)]	Vent [1)]
2	Sample gas outlet [1)]	Sample gas outlet [1)]
3	Purge gas inlet [2)]	Purge gas inlet [2)]
4	Purge gas outlet [2)]	Sample gas inlet [1)]
5	Connection of the pressure sensor [3)]	Connection of the pressure sensor [3, 4)] or purge gas outlet [2)]

6 Socket-head hex screw for securing the case cover

7 Case cover

8 Screwed cable glands M20

9 Screwed cable glands M16

10 Terminal housing with terminal strip (see page 14)

11 Connection for equipotential bonding

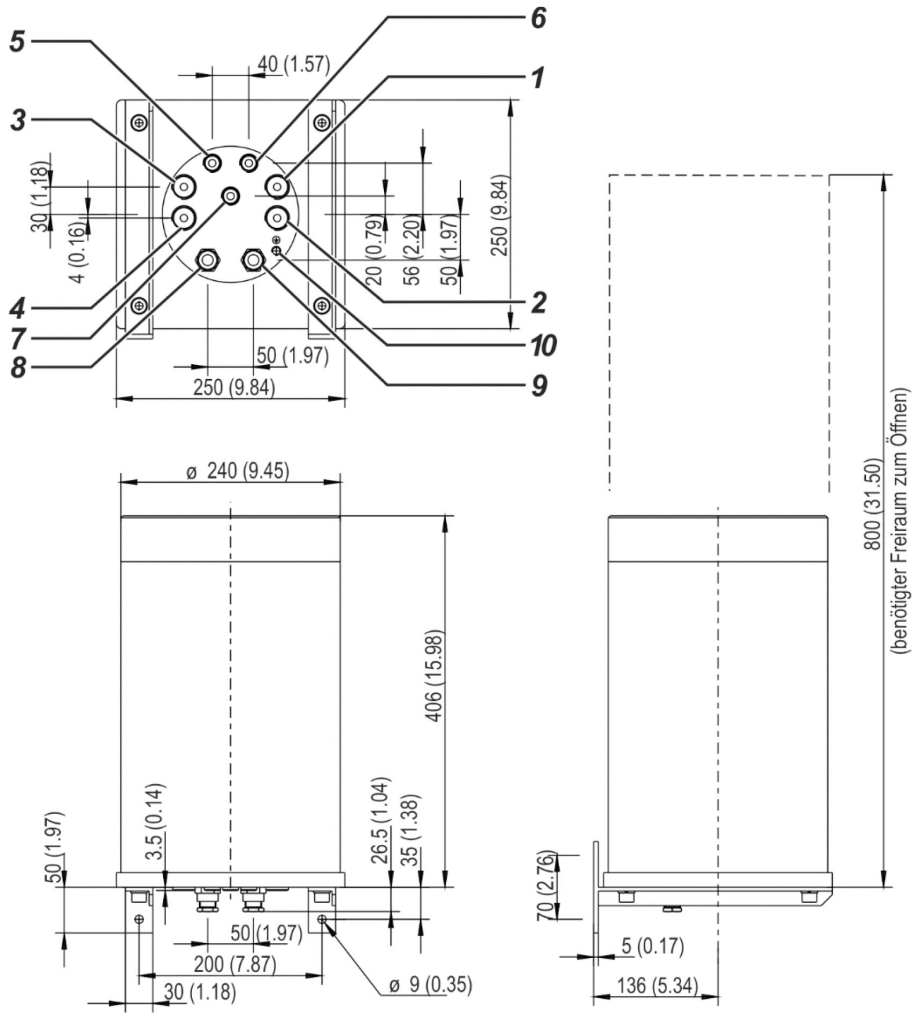
1) if an analyzer has been installed in the control unit
2) Option
3) Option The pressure sensor port must not be connected to the sample gas path when measuring flammable and corrosive gases.
4) Not in the version with housing purge

Design of the gas connections
Internal flame barriers of stainless steel 1.4571 with ⅛ NPT female thread

Space requirements
Note the additional space requirements to the left and to the right of the housing as well as beneath the housing for connection lines (each approx.. 10 cm).

… Dimensions, gas connections

Analyzer unit Uras26



All dimensions in mm (in)

1 |
2 | Assignment of the gas connections ***1*** to ***4*** see device data
3 | sheet(provided with the device)
4 |

5 Purge gas inlet [1)]

6 Purge gas outlet [1)]

7 Pressure sensor [2)]

8 Data transmission cable opening

9 24 VDC connection cable opening

10 Connection for equipotential bonding

1) Option
2) The pressure sensor port must not be connected to the sample gas path when measuring flammable and corrosive gases.

Design of the gas connections
Internal flame barriers of stainless steel 1.4571 with ⅛ NPT female thread

Space requirements
Note the additional space requirements beneath the analyzer unit for connection lines (approx. 10 cm) and above the analyzer unit for opening the housing (approx. 40 cm).

Connecting cables
The permanently connected connecting cables for data transmission and 24 V DC supply are integral components of the flameproof enclosure of the analyzer unit. Both of them are 10 m (33 ft) long and may not be shortened to a length of less than 1 m (3.3 ft).

Certifications and approvals

CE conformity

The EL3060 Series gas analyzers satisfy the requirements of the European directives:
2014/35/EU Low Voltage Directive,
2014/30/EU EMC Directive,
2014/34/EU ATEX Directive and
2011/65/EU RoHS Directive

SIL conformity

The EL3060-Magnos206 and EL3060-Magnos28 gas analyzers without flow and pressure sensor satisfy the requirements of the European standard for functional safety EN 61508:2010 Part 2 (identical to IEC 61508:2010).

Explosion protection to European standards – ATEX

The EL3060 Series gas analyzers with Uras26, Magnos206, Magnos28, Caldos25 and Caldos27 in category 2G for measurement of flammable and non-flammable gases satisfy the requirements of the European standards
EN 60079-0 General requirements,
EN 60079-1 Flameproof enclosures ‘d’ and
EN 60079-7 Increased safety ‘e’.

EL3060-CU without or with analyzer:
Marking: Ex II 2G Ex db eb IIC T4 Gb
EU-Type Examination Certificate no. BVS 08 ATEX E 048 X

EL3060-Uras26 analyzer:
Marking: Ex II 2G Ex db IIC T4 Gb
EU-Type Examination Certificate no. BVS 08 ATEX E 055 X

Explosion protection to IEC standards – IECEx

The EL3060 Series gas analyzers with Uras26, Magnos206, Magnos28, Caldos25 and Caldos27 in the version with EPL Gb for the measurement of flammable and non-flammable gases satisfy the requirements of IEC standards
EN 60079-0 General requirements,
EN 60079-1 Flameproof enclosures ‘d’ and
EN 60079-7 Increased safety ‘e’.

EL3060-CU without or with analyzer:
Marking: Ex db eb IIC T4 Gb
Certificate no. IECEx BVS 13.0037X

EL3060-Uras26 analyzer:
Marking: Ex db IIC T4 Gb
Certificate no. IECEx BVS 13.0056X

Explosion protection for the customs union of Russia, Belarus and Kazakhstan – GOST TR CU

The EL3060 Series gas analyzers with Uras26, Magnos206, Caldos25 und Caldos27 are certified for use in hazardous locations. They may be used for measurement of flammable and non-flammable gases and vapors.

EL3060-CU without or with analyzer:
Marking: II 2G Ex de IIC T4

EL3060-Uras26 Analyzer:
Marking: II 2G Ex d IIC T4

GOST TR CU certificate No. TC RU C-DE.ГБ04.B00277
Pattern approval certificate for Russia No. DE.C.31.004.A No. 37984.

Explosion protection for Japan – TIIS

The EL3060 Series gas analyzers with Uras26, Magnos206 and Caldos27 are certified for use in hazardous locations. They may be used for measurement of flammable and non-flammable gases and vapors.

EL3060-CU, EL3060-Magnos206 Analyzer:
Marking II B + H_2 T4
Certificate no. TC20105

EL3060-Caldos27 Analyzer:
Marking II B + H_2 T4
Certificate no. TC20082

EL3060-Uras26 Analyzer:
Marking: II B T4
Certificate no. TC20078

Explosion protection for China – NEPSI

The EL3060 Series gas analyzers with Uras26, Magnos206, Caldos25 und Caldos27 are certified for use in hazardous locations. They may be used for measurement of flammable and non-flammable gases and vapors.

EL3060-CU without or with analyzer:
Marking: Ex de IIC T4 Gb
Certificate no. GYJ15.1431X

EL3060-Uras26 analyzer:
Marking: Ex db IIC T4 Gb
Certificate no. GYJ15.1430X

Explosion protection for South Korea – KCs

The EL3060 Series gas analyzers with Uras26, Magnos206, Caldos25 und Caldos27 are certified for use in hazardous locations. They may be used for measurement of flammable and non-flammable gases and vapors.

EL3060-CU without or with analyzer:
Marking: Ex de IIC T4
Certificate no. 14-AV4BO-0050

EL3060-Uras26 Analyzer:
Marking: Ex d IIC T4
Certificate no. 14-AV4BO-0051

Sales **Service**

Notes

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